is emphasised by new evidence from North America, in addition to that known from Cape Colony. A brilliant suggestion of Carvill Lewis becomes thus fully justified.

In the fine chapter on the geological history of the colony, the influence of Prof. W. M. Davis (p. 451) now becomes justly manifest. There was little to modify, however, in Dr. Rogers's original review of the great processes that have made South Africa. His suggestion that the S-bends of the rocky gorges in the south are the descendants of meanders formed when the rivers ran over a great plain remains happily unaltered. If South African geologists have learnt willingly from friends whom they invited in 1905 to the coast-ranges and the veld, it will be long before those friends can repay what they themselves received. The guidance then given by Dr. Rogers is renewed and extended in the present admirable volume.

G. A. J. C.

OUR BOOK SHELF.

The Romance of Modern Chemistry. By Dr. J. C. Philip. Pp. 348. (London: Seeley and Co., Ltd., 1910.) Price 5*s*.

ACCORDING to its subtitle, this book is "a description in non-technical language of the diverse and wonderful ways in which chemical forces are at work, and of their manifold application in modern life." After some prefatory historical and theoretical matter, the reader is provided with a wealth of brightly-written and interesting information about fuel and its uses, explosives, low-temperature and high-temperature appliances, and spectroscopy. Modern phases of agricultural chemistry and of industries relating to sugar, starch, fats, and oils are discussed, and the concluding chapters give well-chosen illustrations of applied chemical science in relation to the adulteration of food, the utilisation of by-products, coal-tar products, large-scale electrolysis, solutions, crystals, and industrial catalysis. The last chapter illustrates vividly the part that "accident" has played in chemical discovery.

The most formidable difficulty in writing a book of this kind is to get the reader sufficiently acquainted with the elements of chemical fact and reasoning to enable him to understand the applications. Dr. Philip has adopted a light treatment and allowed himself a free use of imagery of an anthropomorphic kind, which will probably make an impression. To a reader who knows just a little chemistry the interest from the beginning of chapter vi. to the end of the book (chapter xxx.) will be kept fully alive, and as the body of information contained in these chapters is just that which is apt to be omitted from school or evening-class courses of formal chemistry, the book has a very distinct place of usefulness. It is written with an unimpeachable knowledge of scientific chemistry, a very unacademic appreciation and knowledge of practical problems, and a certain amount of human nature, which make the best possible equipment for the author of a book intended to popularise science. The chapter on solutions is particularly worthy of mention as an example of admirable exposition. There are twenty-nine excellent illustrations, which have been selected with care and at considerable trouble, but a long accumulating detestation of the very names stalactite and stalagmite would have reconciled the present writer to a suppression of the three plates dealing with these bedridden natural and etymological phenomena.

A. S.

Hayward's Botanist's Pocket-book. 13th edition. revised and enlarged. By G. C. Druce. Pp. xliv+280. (London: George Bell and Sons, 1909.) Price 4*s*. 6*d*. net.

THE "Botanist's Pocket-book" is well known as a handy companion of a convenient size for the pocket, and containing sufficient data to determine ordinary plants in the field. The original work, published in 1872, was enlarged in 1886 by the addition of an appendix, but, as many changes have recently been rendered necessary, the publishers have wisely authorised Mr. G. C. Druce to make a thorough revision. The general plan remains the same, but there is evidence of Mr. Druce's emendations from the first page to the last. Notably, the synopsis of the natural orders has been corrected, the arrangement of the genera has been altered, and both genera and species have been carefully revised to incorporate the conclusions of present-day authorities and present the nomenclature in accordance with the recommendations of the Vienna Congress.

The revision gives all species and varieties, even certain hybrids, except for the genera Hieracium, Euphrasia, and Rubus. Although the identification of many critical species and varieties will not be decided in the field or even on the scanty data supplied, botanists will not cavil at the decision to include them, especially as it has not necessitated an increase in the size of the volume. It is not apparent why the family names Lamiaceæ and Graminaceæ have been coined, while the substitution of Pinaceæ for Coniferæ to include Taxus cannot be accepted; further, it would have been less perplexing to many botanists to find the nomenclature if not the sequence of the last edition of Babington's "Manual." Doubtless the last point has received the consideration of the reviser, who has rendered another service to botany by placing on record his conceptions based on many years' constant study of British plants.

Yorkshire Type Ammonites. Edited by Mr. S. S. Buckman. Part I. Pp. i–xii, *i–ii,* plates 12, and descriptions Nos. 1–8. (London: W. Wesley and Son, 1909.) Price 3*s*. 3*d*. net.

IT is intended that this work shall appear in about sixteen parts. The object of the publication is to give an adequate pictorial and critical revision of the type-specimens of Jurassic ammonites from Yorkshire which were unsatisfactorily described or figured by the early authorities Young and Bird, John Phillips and Martin Simpson. The treatment is similar to that in the well-known "Palæontologia Universalis," and the excellent illustrations in collotype process are from photographs of the actual specimens, mainly by Mr. J. W. Tutcher. In addition to a reprint of the original diagnoses, supplemented by useful critical remarks, the editor has supplied a clearly arranged and concise account of the comprehensive system of terminology which has been adopted by those who have made the most advanced studies of ammonite-development. He has also added some original and suggestive remarks on the cyclical development of the shell-form. In another section of the work there are useful notes on generic names. Twelve plates are issued in the present part, with text relating to eight species, and the introductory matter is uncompleted. This work will prove indispensable, not only to those who take a serious interest in Yorkshire geology, but to all students of Jurassic ammonites.

Klimatographie von Österreich. Part IV. *Tirol und Vorarlberg.* By Dr. H. v. Ficker. Pp. vi+162. (Vienna: Gerold und Komp, 1909.)

THIS volume forms part iv. of the valuable handbook on the climatology of Austria which is being issued by

© 1910 Nature Publishing Group

the Zentralanstalt für Meteorologie und Geodynamik of Vienna. It deals with the Tyrol and Vorarlberg, and has been prepared by Dr. H. v. Ficker with the cooperation, in the botanical and zoological part, of Prof. von Dalla Torre. The region under discussion is one of special interest by reason of the great contrasts which it presents. The North Tyrol is formed by the valley of the Inn and its tributaries. Here we have a long valley running east and west, and protected both to north and to south by high mountains. Föhn winds are frequent, and have a decided effect in raising the mean temperature. As a result many flora and fauna which are characteristic of more southern latitudes manage to persist. In the South Tyrol the main valleys, Etsch and Eisach, run from north to south. To the north they are protected by the central Alpine range, but to the south they are freely open to the plain of the Po. The Pustertal, running west to east, forms a region by itself. It is freely exposed to winds from the east, which have a decided influence in lowering the winter temperature. Finally, in Vorarlberg we have again a different arrangement. The valleys slope down to the north-west towards Lake Constance. This fact has an important influence on the climate, as the prevailing wind over this part of Europe is from north-west. The climatological data are discussed on the lines suggested by Hann in his "Lehrbuch der Klimatologie," which have been followed also in the previous volumes of the series. The peculiarities of each region are clearly set out and contrasted with one another.

The Scholar's Book of Travel. Part i., The British Isles and Readings in Physical Geography. Pp. viii+197. Part ii., Europe. Pp. viii+198. Part iii., Other Lands. Pp. viii+200. Part iv., The British Empire. Pp. viii+200. (London: George Philip and Son, Ltd., n.d.) Price 1*s.* 3*d.* each.

Cambridge County Geographies. Cambridgeshire. By Prof. T. McKenny Hughes, F.R.S., and Mary C. Hughes. Pp. xiii+271. (Cambridge: The University Press, 1909.) Price 1*s.* 6*d.*

THE teaching of geography in this country is undergoing a complete change. Efforts are being made in every direction to create interest in the human aspects of geography and also to render the study of the subject a training in the methods of science. The pupil is no longer merely set to learn by heart lists of geographical data, but he is encouraged by the study of maps, by simple experiments, and by reference to original sources, to discover and to arrange facts for himself, and by his own efforts to arrive at simple, broad geographical principles.

"The Scholar's Book of Travel" is designed to provide the young pupil with literary extracts from books of travel, and to give him the opportunity of learning from first hand accounts about this and other countries. The four little volumes should serve a distinctly useful purpose, especially as they will probably send the learner to the excellent books from which the extracts are taken. The majority of the excerpts are from the older writers—Livingstone, Speke, Mungo Park, Defoe, Kingsley, Darwin, to name a few—but the beauty and interest of the passages will doubtless make the reader desire to read the works of modern travellers.

The volume dealing with Cambridgeshire follows the general lines of the series to which it belongs, and these have been described on previous occasions. The authors provide an excellent account of an interesting county, and readers will find that though called geography the book gives particulars of the geology, history, antiquities, architecture, and the roll of honour of the district.

LETTERS TO THE EDITOR.

[The Editor does not hold himself responsible for opinions expressed by his correspondents. Neither can he undertake to return, or to correspond with the writers of, rejected manuscripts intended for this or any other part of NATURE. *No notice is taken of anonymous communications.]*

The Fertilising Influence of Sunlight.

THE past history of agricultural science furnishes several examples of belated explanations of the utility of practices the value of which has long become a tradition among practical men. The explanation of the value of leguminous crops in agriculture is a good example. While the recognition of the *rôle* of these crops in increasing the nitrogen supply in the soil has done much to improve agriculture in new countries, it has only served to provide a scientific approval of the cultural practices of ancient civilisations, such as that of India, where from time immemorial it has been the custom to grow leguminous crops in the rotation and also as one of the constituents of the mixed crops cultivated in many parts of the country.

Agricultural science has recently provided another explanation of an ancient Indian practice. In the *Journal of Agricultural Science* of October last, Drs. Russell and Hutchinson have found that partial sterilisation of the soil by heating or by poisons leads to an increase in the supply of nitrogenous compounds and to increased fertility. These investigators state that partial sterilisation of the soil kills off the phagocytes which live on bacteria, and also large organisms inimical in other ways to bacteria. At the same time the soil bacteria are killed off, but the spores remain which germinate and rapidly multiply when the soil is moistened. The new bacterial cultures increase at an enormous rate, and the resulting nitrogenous plant food becomes so great that plant growth is greatly stimulated. The authors then go on to state (p. 120):—"There is reason to suppose therefore that the large destructive and competing organisms will be found of common occurrence in ordinary soils, checking the beneficial bacteria and limiting fertility. An important practical problem arises: is it possible to suppress them in ordinary field soils by any economical and practical process?"

The practice among many of the best cultivators in the Indo-Gangetic plain furnishes a most emphatic affirmative to the above question. It has been the practice of the ryots for centuries past to expose the alluvial soils of the plains of India to the intense heat and light of the Indian hot weather in April and May. The beneficial result on the succeeding crop is extraordinary, and has all the effect of a nitrogenous manuring. It is much more than probable that the result of this weathering is a partial sterilisation of the soil, and that Russell and Hutchinson's explanation is the correct one. Except in market-garden crops near the cities and in crops like sugar-cane and tobacco, manures are but little used in India. The growth of leguminous crops and the weathering of the soil during the hot season appear to be sufficient to keep up the fertility. More nitrogenous manure would no doubt be an advantage, but a great deal could be done by the cultivators themselves in weathering the soil during the hot weather in a more efficient manner than at present.

The extended use of cheap light iron soil-inverting ploughs during the hot, dry weather after the *rabi* harvest would do much to bring about a better exposure of the soil to the sun, and a more complete sterilisation. The wooden ploughs now in use are not adapted to open up the heavier lands unless they are moistened by rain, and in consequence a large area of the arable land is not ploughed at all until the monsoon. We consider one of the greatest improvements possible in Indian agriculture would be to impress on the ryot the value of weathering all arable lands in April and May to a much greater extent than is done at present. When iron has taken the place of wood in the ploughs of the Indo-Gangetic plain, it will be possible for the cultivator to take the fullest advantage of, and greatly extend, their present most admirable practice. In collaboration with Mr. H. M. Leake, economic botanist to the Government of the United Provinces, we have in progress a series of experiments in which the practical

© 1910 Nature Publishing Group